

# Commonwealth of Virginia Clinical Study

## *Immunization Status at 24 Months*

CY 2004



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## At-A-Glance: Immunization Status at 24 Months

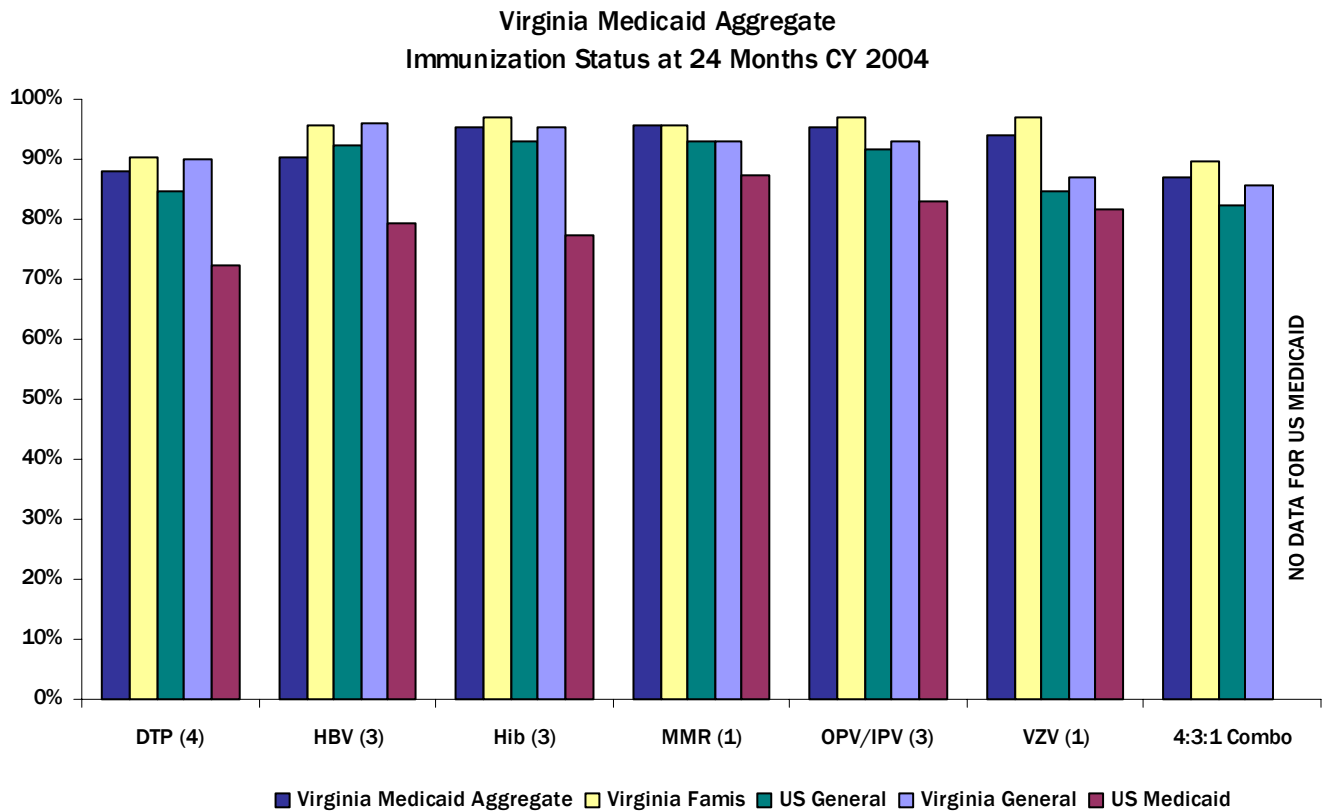
### Study Overview

Immunization completion rates are a standard quality of care measure emphasized in both national and state Healthy People 2010 programs and the national Government Performance and Results Act (GPRA) initiative to increase the percentage of 2-year-old children who are fully immunized. Appropriate immunization completion is strongly associated with a reduction in preventable disease rates, and routine immunization has been described as a cost-effective and highly beneficial component of appropriate childhood medical care.

As part of its Quality Assessment and Improvement Program, the Virginia Department of Medical Assistance Services (DMAS) encourages the care providers who serve the Medicaid, Family Access to Medical Insurance Security (FAMIS), and FAMIS Plus population to implement projects aimed at increasing the number of 2-year-old children who are fully immunized. In addition, DMAS strives to increase the immunization rates of all children in Medicaid and FAMIS and has set an ambitious immunization compliance target of 85%.

A review of medical records was conducted for a randomly selected sample of children in each of the Medicaid care delivery systems (MEDALLION, Medallion II, and fee-for-service) and for the FAMIS program. Detailed results for each care delivery system and program, as well as trends and comparisons with state and national averages, are available within this report. Statewide results are indicated in the following figure.

Figure 1. Percentage of cases with complete immunizations, by care delivery system and aid program (Virginia Medicaid, CY 2004)



## Conclusions

- In general, children served by Virginia Medicaid programs are at or above the immunization levels of the U.S. and Virginia general populations.
- Immunization levels for children served under the FAMIS program are consistent and even slightly above the Medicaid immunization levels.
- Compliance rates from SFY 1998 through CY 2004 appear to be increasing moderately, with almost all of the immunization indicators at or above the targeted compliance rate of 85%.
- The CY 2004 results for DTP are 5% points lower than SFY 2004 while other immunization rates are consistent.

## Clinical Study: Immunization Status at 24 Months

### Introduction

As part of its Quality Assessment and Improvement Program, the Virginia Department of Medical Assistance Services (DMAS) commissioned a study to assess the degree to which 2-year-old children enrolled in Medicaid, Family Access to Medical Insurance Security (FAMIS), and FAMIS Plus are fully immunized. The study was conducted by Delmarva Foundation, which is the external quality review organization (EQRO) under contract to DMAS. The EQRO is charged with independently assessing the quality services delivered to beneficiaries enrolled in Virginia Department of Medical Assistance Services' care delivery systems and aid programs. This assessment was conducted to ensure that high-quality accessible care, which is consistent with generally accepted standards, is provided to Medicaid, FAMIS, and FAMIS plus enrollees. The study includes an assessment of the success of the programs in providing appropriate immunizations to program recipients who turned 2 years of age during state calendar year (CY) 2004 (January 1, 2004 to December 31, 2004).

Compliance with immunization requirements is a complex phenomenon and results from the interaction of a variety of factors, including:

- Family and child internal and external environment,
- Contraindications for vaccines,
- Vaccine supply,
- The relationship between the family and the provider, and
- Quality of the services provided that could promote or encourage compliance.

The inability of an enrollee to adhere to an immunization program can therefore result from a variety of factors, only some of which are within the control of the provider. Provision of enabling services such as transportation, child care support, and reminders of upcoming vaccinations may decrease the number of vaccine doses missed and improve compliance with immunization requirements.

Because appropriate immunizations are strongly associated with a reduction in preventable disease rates, ensuring appropriate immunizations has been emphasized in programs aimed at improving health care, especially among the youngest and most vulnerable children. Routine immunization has been described as a cost-effective and highly beneficial component of appropriate childhood medical care.

Immunization rates are a useful outcome measure for assessing health care quality because the technical standard of care that defines the type and timing of an appropriate immunization regimen is well established.

The Advisory Committee on Immunization Practices, the American Academy of Pediatrics' Committee on Infectious Disease, and the American Academy of Family Physicians has all endorsed these standards. Furthermore, guidelines are updated regularly in a coordinated manner allowing new evidence regarding the safety and efficacy of vaccines to be incorporated. In addition, detailed and prescriptive standards have been established for documentation of vaccine delivery and outreach. Immunization performance is a key element of the Health Plan Employer Data and Information Set (HEDIS®<sup>1</sup>), and is a standard quality of care measure emphasized in both National and State Healthy People 2010 programs. The recent Government Performance and Results Act (GPRA) initiative to increase the percentage of two-year-old children who are fully immunized provides additional momentum to the issue of childhood immunization compliance.

This area of focused clinical review was selected because it 1) addresses care that affects a high proportion of Medicaid, FAMIS, and FAMIS plus enrollees in the managed care programs, 2) has the potential to affect medical resource utilization, and 3) is important in ensuring the quality of care. In addition, because national guidelines for immunization of two-year-old children have been established, national rates of immunization provide a useful benchmark for DMAS. Similarly, DMAS has commissioned an immunization study for several years; thus, the framework for monitoring the continuous quality efforts via trend analysis is in place.

## Background

During the study period, three distinct Medicaid and FAMIS care delivery systems operated in Virginia: PCCM, MCOs, and fee-for-service (FFS). A primary care case management (PCCM) model for Medicaid-eligible or Family Access to Medical Insurance Security (FAMIS) individuals is in targeted geographic areas. MCOs contracted with DMAS to supply health coverage for both Medicaid eligible and FAMIS children. Medicaid-eligible enrollees and FAMIS children, not covered through either the PCCM or MCO programs, received covered services through a Fee-for-Service (FFS) system. The current study was designed primarily to profile the immunization services provided under each of these care system models. For the purposes of this study, children who receive care through the FAMIS Plus program are considered a part of the General Medicaid population, as they receive the full Medicaid benefits package and have no cost sharing responsibilities.

Results are separated by care delivery system and subdivided into aid programs. Aid programs include:

- Children in all other aid programs (including Temporary Assistance to Needy Families, refugees, low-income families with children, FAMIS plus, etc.), labeled *General Medicaid*, and
- Children who received services through FAMIS during the study period are reported separately.

These results are divided by care delivery system (FFS, PCCM, and MCO).

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<sup>1</sup> HEDIS® is a registered trademark of the National Committee on Quality Assurance.

## Methods

This study was undertaken to provide an assessment of compliance with medical standards related to current early childhood immunization practices. The study consisted of a review of a random sample of immunization records for children age 24 months during CY 2004 who received services through DMAS.

### Quality Indicators

To assess the quality of care regarding immunization status, an immunization record review approach was taken. Key quality indicators were developed based on the American Academy of Pediatrics and the Advisory Committee on Immunization Practices guidelines.

The compliance standards for the indicators were as follows:

- DTP (diphtheria, tetanus, pertussis)—four doses by age 24 months.
- HBV (hepatitis B)—three doses by age 24 months.
- Hib (*Haemophilus influenza* type b)—three doses by age 24 months.\*
- MMR (measles, mumps, rubella)—one dose by age 24 months.
- OPV/IPV (oral or injected polio vaccine)—three doses by age 24 months.
- VZV (varicella)—one dose by age 24 months.
- 4:3:1 Combination (4 DTP/3 polio/1 MMR) by age 24 months.

A 1-month grace period was observed for the completion of immunizations after the child's second birthday.

Medical record documentation was submitted to Delmarva for review, thus providing the raw data for evaluating compliance with medical standards related to childhood immunization practices. Performance measures were computed for each individual vaccination as well as for the 4:3:1 combination of vaccinations (taken as a measure that the individual was completely up-to-date with immunizations at age 24 months). A medical record was scored to be compliant for a given indicator if the documentation indicated that the patient was up-to-date with the immunization schedule for the given vaccine or combination; otherwise, the record was scored as noncompliant with the indicator.

The results of this study can provide a foundation for future intervention strategies designed to improve the quality of preventive care for children in Virginia Medicaid programs. While no single approach to the collection and reporting of immunization can be considered a “gold standard,” this study utilizes a standard approach (i.e., collecting data from medical records) that is generally well accepted and can provide useful

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\*Note: Compliance standards for Hib were reduced to three doses to be consistent with HEDIS reporting.



quantitative information on provider practice patterns related to the key quality indicators. The study approach does not provide individual practitioner profiles.

### Study Population and Medical Record Sample Selection

The study population consisted of Medicaid or FAMIS individuals who had:

- A date of birth between January 1, 2002 and December 31, 2002 (i.e., turned 2 years of age during the review period),
- At least one medical encounter during CY 2004, and
- Continuous enrollment for 6 months or more in one of the designated care delivery systems during the study period.

Using encounter and enrollment data files provided by DMAS, Delmarva identified a random sample of enrollees from the study population for medical record review. The study was designed to provide an estimate of the rates of immunization within each of the designated programs. The target sample size selected was sufficient to ensure a 90% confidence interval (CI) with a maximum allowable sampling error of 10% for each of the programs. Over-sampling was performed in an effort to ensure an adequate sample size.

Random samples were drawn for those individuals covered by each care delivery system (PCCM, MCO and FFS) and program, Medicaid and FAMIS. Identification of the primary provider of medical services for individuals in the sample was essential for requesting medical records; the method for determining the primary provider depended on the system of care (FFS, MCO, PCCM) in which a child was enrolled. For individuals in the FFS system, the list of individuals selected for study (i.e., from the files provided by DMAS) was provided to the claims processing vendor for the Commonwealth of Virginia with a request to identify the primary provider of medical services for these individuals. Providers identified in the following specialty categories were considered appropriate: general practice, family practice, internal medicine, and pediatrics. The provider that appeared to be most involved with the care of the child, as determined by a review of information available to the claims processing vendor, was designated as the “provider of record” for purposes of this study. For individuals receiving care through the MCO system, the list of individuals selected for study was provided to the individuals’ MCO and the MCO identified the primary care provider for each individual. For the PCCM system, the lock-in provider identified in the DMAS enrollment file was the designated primary care provider.

Information in the Virginia provider files was used to address a written record request to the provider. The purpose of this request was to validate that the individual selected met all specified sampling criteria and to obtain the complete CY 2004 immunization record of each child. A minimum of three attempts was made to contact each provider of record. In the event that the identified provider was no longer associated with a particular practice or involved in the treatment of the particular child, an effort was made to obtain additional information that would facilitate identification of an appropriate service provider. Individuals who did not



meet all study inclusion criteria or for whom no provider could be identified were excluded from further consideration.

### Medical Record Data Collection

Pertinent immunization data were abstracted by registered nurse reviewers from the valid immunization records and entered into an electronic data collection system. Delmarva Foundation developed the electronic data collection system that was used to collect and store the data. Nurse reviewers were trained to use the data collection system. Detailed abstraction guidelines/rules were used during the medical record abstraction to ensure that the data were collected in an objective and reliable manner, thereby reducing the potential for variability in the interpretation of the information documented in the immunization records. Reviewers were supervised by a trained registered nurse with extensive experience in medical record abstraction.

### Compliance with Medical Record Request

The number of records requested from each care delivery system was based on the population size. Table 1 shows the population by care delivery system and aid program.

**Table 1. Number of 24 month-old children in Virginia DMAS care delivery systems and aid programs (Immunization Status at 24 Months Study, CY 2004)**

Care Delivery System	Medicaid/ FAMIS Plus	FAMIS	Total for All Aid Programs
FFS	1459	231	1690
MCO	17732	1984	19716
PCCM	3411	24	3435
<b>Total</b>	<b>22602</b>	<b>2239</b>	<b>24841</b>

The target sample sizes for substrata were based on the substrata population size and the expected rate for the indicators. HEDIS methodology conservatively sets the expected indicator rate at 50%; however, based on the previous SFY 2004 Immunization Status at 24 Months Study, indicator levels of 80% or better were expected.<sup>2</sup> Thus, target sample sizes were set based on previous indicator rates. In addition, an over-sample was drawn for each substratum to compensate for incomplete and invalid records or non-response by providers. The total number of records requested (based on the target sample size and over-sample) is given in Table 2.

<sup>2</sup>HEDIS® is a registered trademark of the National Committee for Quality Assurance.

Table 2. Number of records requested for Virginia DMAS care delivery systems and aid programs (Immunization Status at 24 Months Study, CY 2004)

Eligibility Category / Program Type	Medicaid/ FAMIS Plus	FAMIS	Grand Total
FFS	75	70	145
MCO	83	84	167
PCCM	83	24	107
Total	241	178	419

Statewide Medicaid and FAMIS providers submitted 302 valid medical records for review. The number of valid records received by aid program and care delivery system is presented in Table 3.

Table 3. Immunization study sample sizes (number of records received), by aid program and care delivery system (Virginia Medicaid, CY 2004)

Care Delivery System	Medicaid/ FAMIS Plus	FAMIS	Total for All Aid Programs
FFS	40	37	77
MCO	78	84	162
PCCM	50	13	63
Total	168	134	302

The values in Table 3 are the denominators for the indicators (unless a particular immunization was contraindicated for an individual, in which case the denominator is reduced). The valid response rate (number of valid records divided by the total number of records requested) for each subgroup is listed in Table 4.

Table 4. Rate of valid responses for medical record request, by aid program and care delivery system (Virginia Medicaid, CY 2004)

Care Delivery System	Medicaid/ FAMIS Plus	FAMIS	Total for All Aid Programs
FFS	53%	53%	53%
MCO	94%	100%	97%
PCCM	60%	54%	59%
Total	70%	75%	72%

Overall, the rate of valid responses for the medical record request was 72%. This response rate is slightly higher than that reported for other provider reported vaccination histories such as found in the National

Immunization Survey where a response rate of 71% was achieved (Smith PJ et al., 2001). The response rates were also consistent with reports in the literature of immunization studies that must rely on data obtained in a limited time frame from a somewhat restricted range of potential providers (Rodewald, 1998). Some reasons for non-response included: incorrectly identified PCP, provider was no longer treating a child, or incorrect provider contact information.

## Results

Results for the Medicaid population (including Title V/SSI and other Medicaid recipients) and the FAMIS population are reported separately.

### Medicaid Results

The overall compliance rates for the selected immunizations are presented in Table 5. Detailed results (broken out by care delivery system) are presented in figures in the following pages. The rate of compliance with a fully completed immunization series (4:3:1) at 24 months was 86.9%. The DMAS target performance level for the immunization series (4:3:1) indicator was 85%. Thus, the rate of compliance in CY 2004 exceeded the targeted performance level for this series.

**Table 5. Immunization status at 24 months: statewide results for indicator rates (Virginia Medicaid, CY 2004)**

Indicator Description	Numerator/Denominator	Medicaid Aggregate Rate	95% Confidence Interval
DTP	148/168	88.1%	84.0% to 92.2%
HBV	152/168	90.5%	86.8% to 94.2%
Hib	160/168	95.2%	92.5% to 97.9%
MMR	161/168	95.8%	93.3% to 98.4%
OPV/IPV	160/168	95.2%	92.5% to 97.9%
VZV	158/168	94.0%	91.1% to 97.0%
4:3:1	146/168	86.9%	82.6% to 91.2%

This finding of a lower compliance rate for a specific defined immunization series compared with compliance rates for single antigens is consistent with reports at both national and state levels (e.g., Centers for Disease Control and Prevention vaccination coverage reports; Rodewald, Szilagyi, et al., 1999). The statewide results demonstrate that Medicaid care providers have performed well in meeting their obligations to provide vaccines to children in Virginia. The compliance level was above 85% for all immunizations. These results

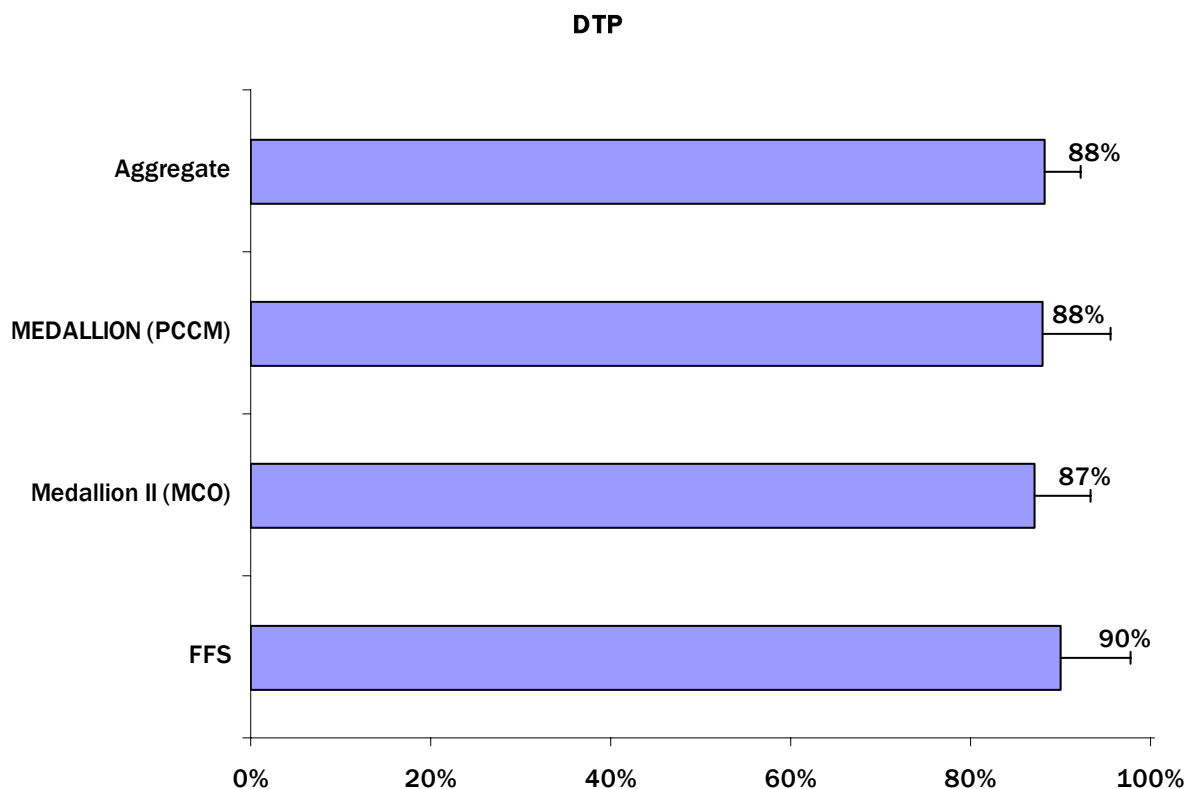
indicate that care providers working with DMAS have performed well in meeting their obligations to provide vaccines to children in Virginia.

Further details of performance for each individual immunization and the complete 4:3:1 series within each care delivery system are given in Figures 1 through 7. As an interpretive aid, error bars indicating the upper limit of the 95% confidence level for each reported rate are also presented.

### Medicaid Results by Immunization Series

Figure 2 presents the rates of compliance with the DTP (diphtheria, tetanus, and pertussis) immunization for the care delivery systems studied as well as the aggregate rate for the systems administered by DMAS through Medicaid, which may be taken as a reflection of the overall Medicaid rate for this immunization.

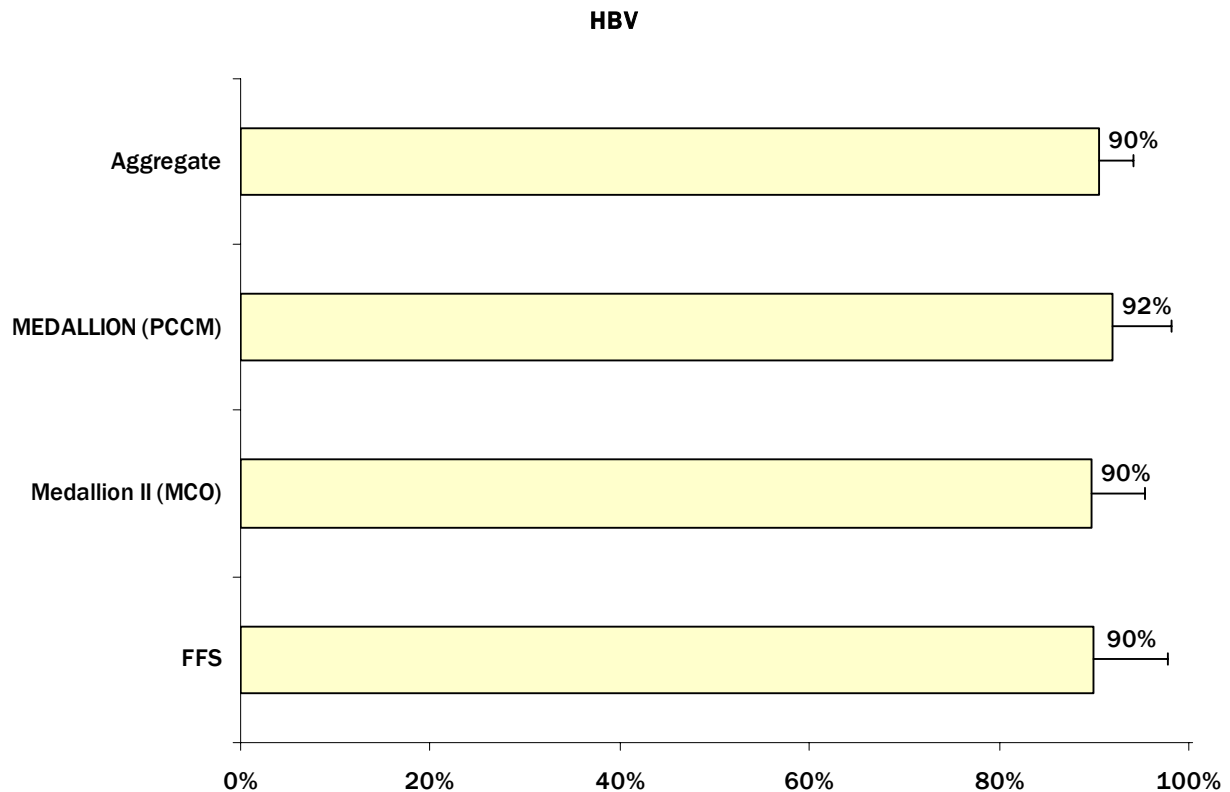
**Figure 2. Percentage of cases with complete DTP immunization, by care delivery system and aid program (Virginia Medicaid, CY 2004)**



Rates of compliance with the DTP indicator ranged from a high of 88% for the Medallion program, to a low of 87% for the Medallion II. The aggregate state Medicaid rate across all program types was 88% (CI = 84.0% to 92.2%).

Figure 3 presents the rates of compliance with the HBV (hepatitis B) immunization for the care delivery systems studied as well as the aggregate rate for the systems administered by DMAS through Medicaid, which may be taken as a reflection of the overall Medicaid rate for this immunization.

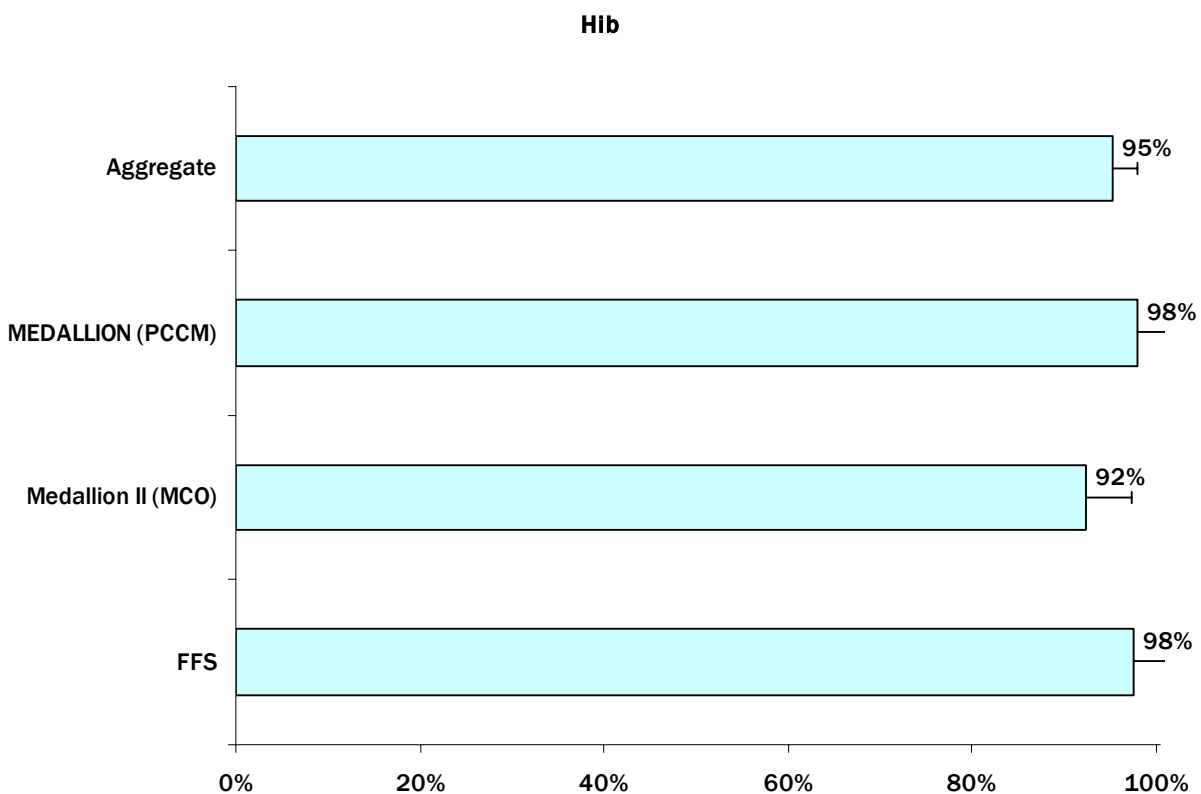
**Figure 3. Percentage of cases with complete HBV immunization, by care delivery system and aid program (Virginia Medicaid, CY 2004)**



Rates of compliance with the HBV indicator ranged from a high of 92% for the PCCM program, to a low of 90% for the MCO and FFS programs. The aggregate state Medicaid rate across all program types was 90% (CI = 86.8 % to 94.2%).

Figure 4 presents the rates of compliance with the Hib (*Haemophilus influenza* type b) immunization by the health care delivery system as well as the aggregate rate for DMAS, which is equivalent to the overall Medicaid rate for this immunization.

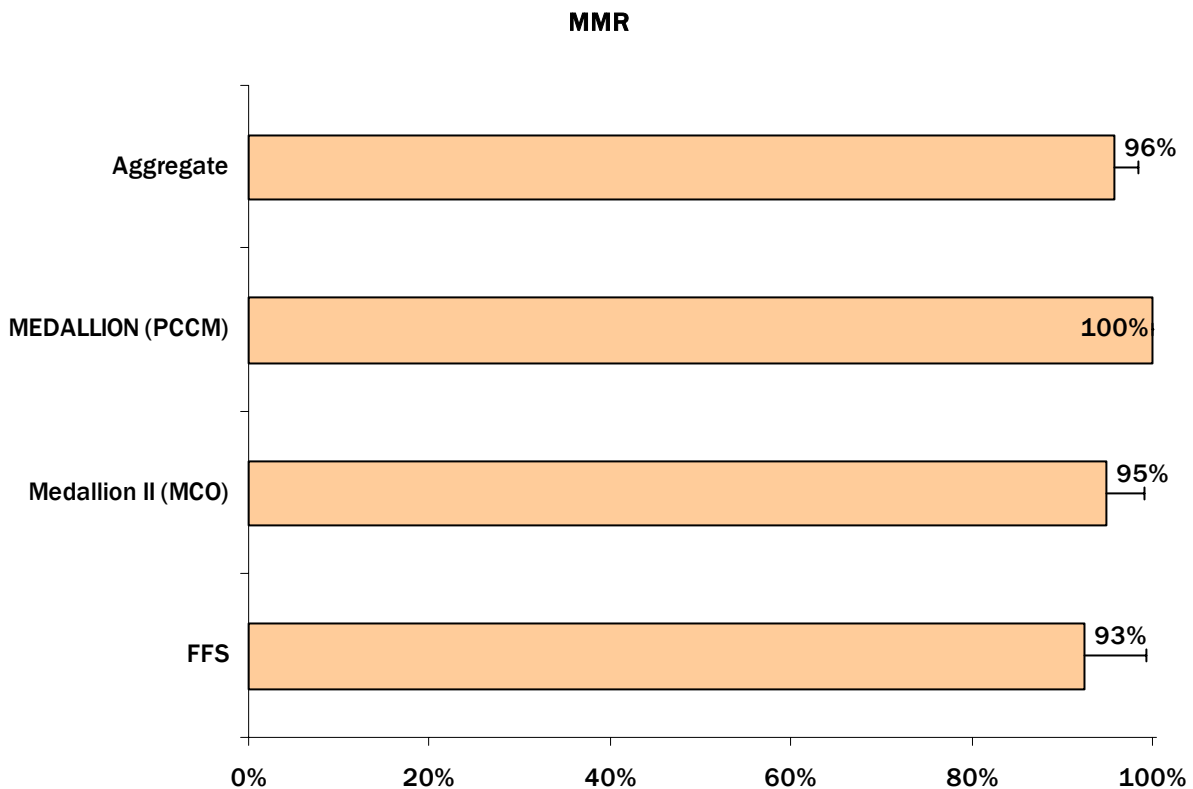
**Figure 4. Percentage of cases with complete Hib immunization, by care delivery system and aid program (Virginia Medicaid, CY 2004)**



Rates of compliance with the Hib indicator ranged from a high of 98% for the PCCM program, to a low of 92% for the MCO programs. The aggregate state Medicaid rate across all program types was 95% (CI = 92.3% to 98.1%).

Figure 5 presents the rates of compliance with the MMR (measles, mumps, rubella) immunization for the care delivery systems studied as well as the aggregate rate for the systems administered by DMAS through Medicaid.

**Figure 5. Percentage of cases with complete MMR immunization, by care delivery system and aid program (Virginia Medicaid, CY 2004)**

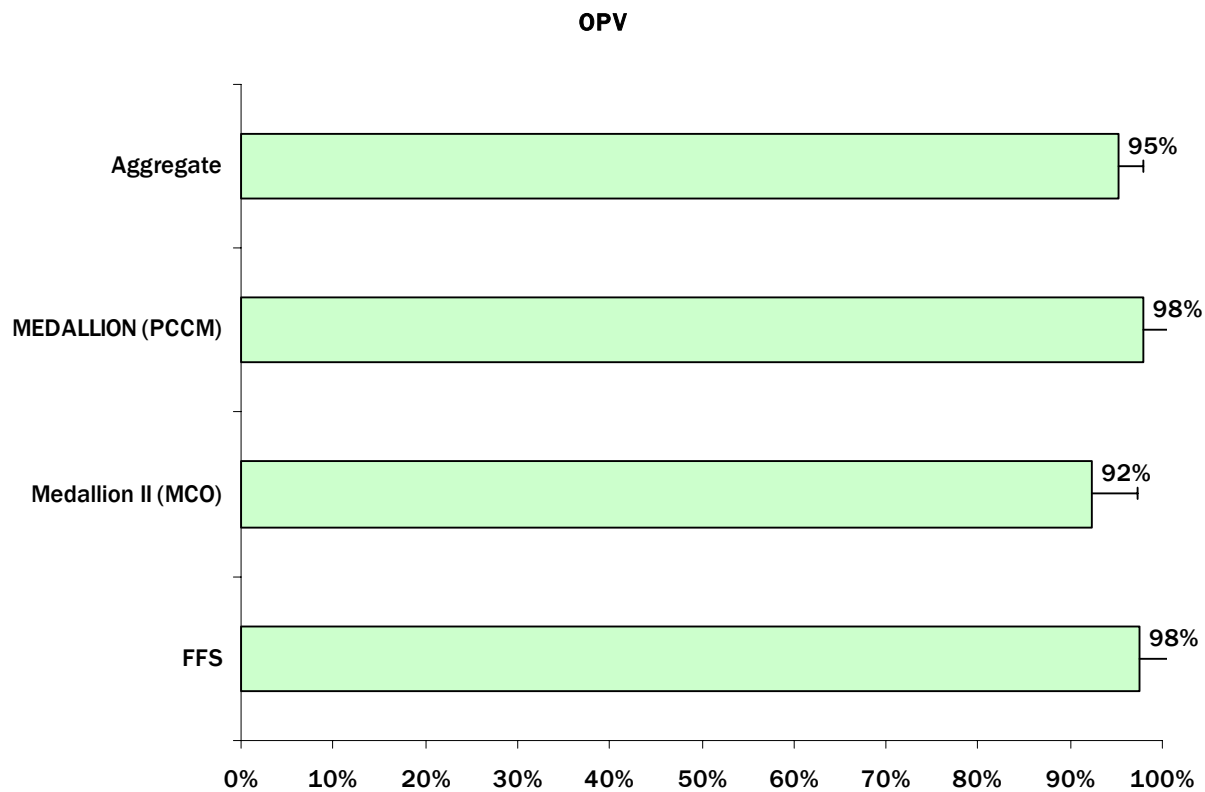


Rates of compliance with the MMR indicator ranged from a high of 100% for the PCCM program, to a low of 93% for the FFS program. The aggregate state Medicaid rate across all program types was 96% (CI = 92.7% to 98.9%).



Figure 6 presents the rates of compliance with the OPV/IPV (oral or injected polio vaccine) immunization for the care delivery systems studied as well as the aggregate rate for the systems administered by DMAS through Medicaid.

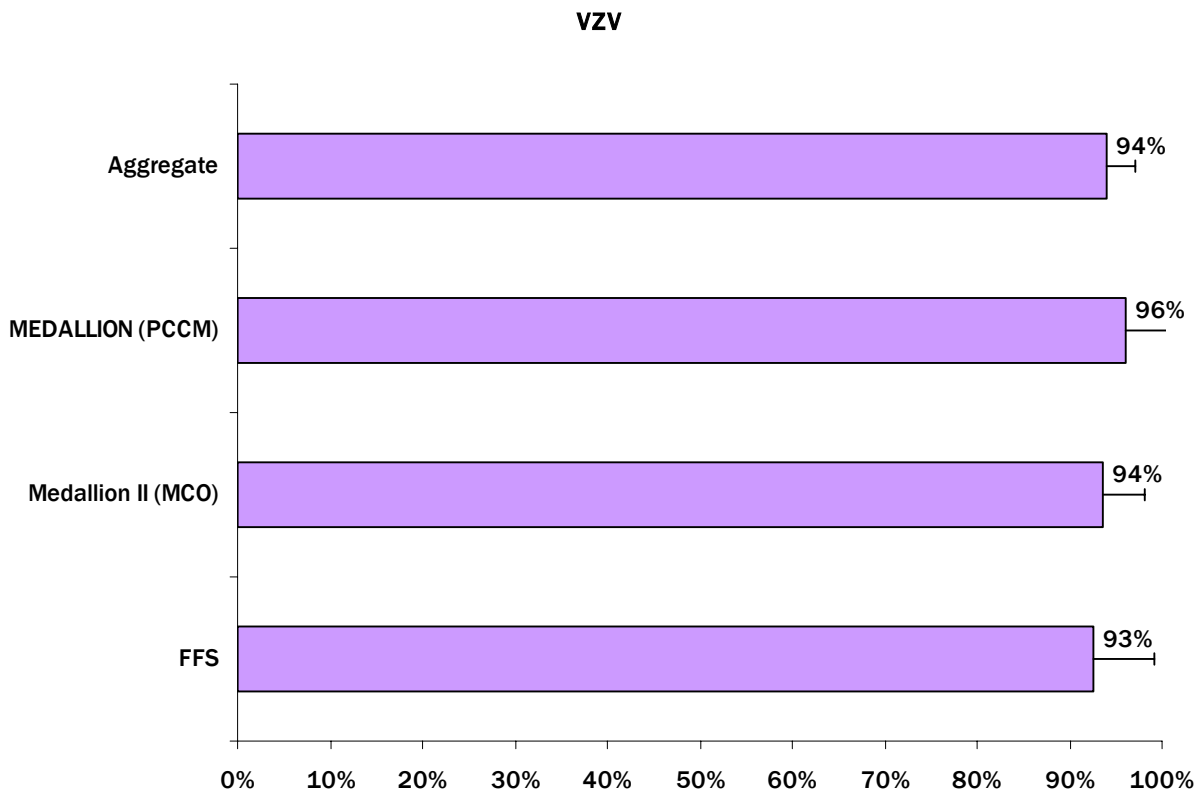
**Figure 6. Percentage of cases with complete OPV immunization, by care delivery system and aid program (Virginia Medicaid, CY 2004)**



Rates of compliance with the OPV/IPV indicator ranged from a high of 98% for the FFS and PCCM programs, to a low of 92% for the MCO program. The aggregate state Medicaid rate across all program types was 95% (CI =92.3% to 98.1%).

Figure 7 presents the rates of compliance with the VZV (varicella) immunization for the care delivery systems studied as well as the aggregate rate for the systems administered by DMAS through Medicaid.

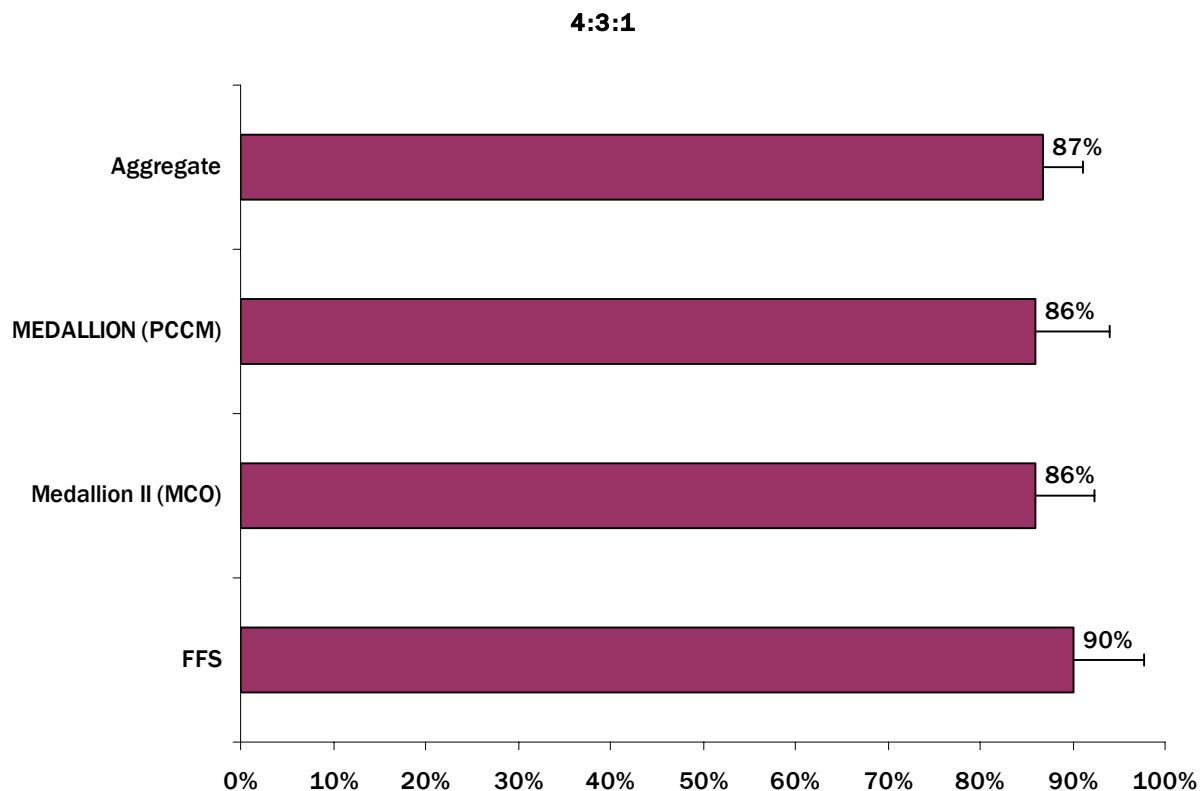
**Figure 7. Percentage of cases with complete VZV immunization, by care delivery system and aid program (Virginia Medicaid, CY 2004)**



Rates of compliance with the VZV indicator ranged from a high of 96% for the PCCM program to a low of 93% for the FFS programs. The aggregate state Medicaid rate across all program types was 94.3% (CI = 90.6% to 97.4%).

Figure 8 presents the rates of compliance with the 4:3:1 immunization series (4 DTP/3 polio/1 MMR, by 24 months of age) for the care delivery systems studied as well as the aggregate rate for the systems administered by DMAS through Medicaid

**Figure 8. Percentage of cases with complete 4:3:1 immunization series, by care delivery system and aid program (Virginia Medicaid, CY 2004)**



Rates of compliance with the complete 4:3:1 series indicator ranged from a high of 90% for the FFS program, to a low of 86% for the Medallion PCCM and Medallion II MCO programs. The aggregate state Medicaid rate across all program types was 87% (CI =82.6% to 91.2%).

Overall, the care delivery systems performed well, with all programs scoring 85% or higher for all immunization indicators. No one program appeared to demonstrate better immunization rates across all the indicators. The error bars for the programs and systems in Figures 2 through 8 cover similar ranges; any differences in the actual rates by program and system are probably attributable to sampling and not indicative of meaningful differences in programs.

## FAMIS Results

The FAMIS aggregate compliance rate for each of the selected individual immunizations is presented in Table 6. The rate of compliance with a fully completed immunization series (4:3:1) at 24 months was 89.6%.

**Table 6. Immunization status at 24 months: FAMIS statewide results for indicator rates (Virginia Medicaid, CY 2004).**

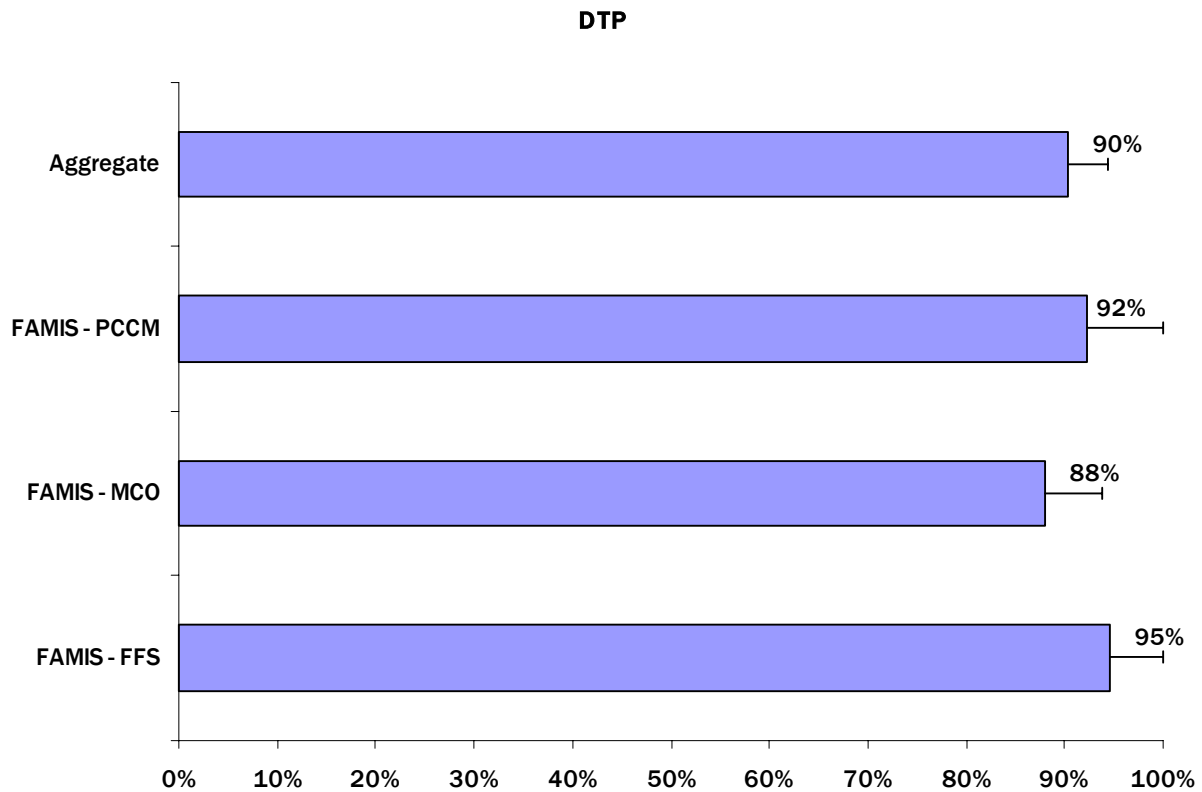
Indicator Description	Numerator/Denominator	Medicaid Aggregate Rate	95% Confidence Interval
DTP	121/134	90.3%	86.2% to 94.4%
HBV	128/134	95.5%	92.7% to 98.4%
Hib	130/134	97.0%	94.7% to 99.4%
MMR	128/134	95.5%	92.7% to 98.9%
OPV	130/134	97.0%	94.7% to 99.4%
VZV	130/134	97.0%	94.7% to 99.4%
Combo (4:3:1)	120/134	89.6%	85.3% to 93.8%

This finding of a lower compliance rate for a specific defined immunization series compared with compliance rates for single antigens is consistent with reports at both national and state levels (e.g., Centers for Disease Control and Prevention vaccination coverage reports; Rodewald, Szilagyi, et al., 1999). The statewide results demonstrate that FAMIS care providers have performed well in meeting their obligations to provide vaccines to children in Virginia. The compliance level was well above 85% for all indicators.

Table 6 provides an overall summary of immunization rates across all of the delivery systems studied, and is useful as an overview. Further details of performance for individual immunizations and the complete 4:3:1 series within each care delivery system are given in Figures 9 through 15. As an interpretive aid, error bars indicating the upper limit of the 90% confidence level for each reported rate are also presented.

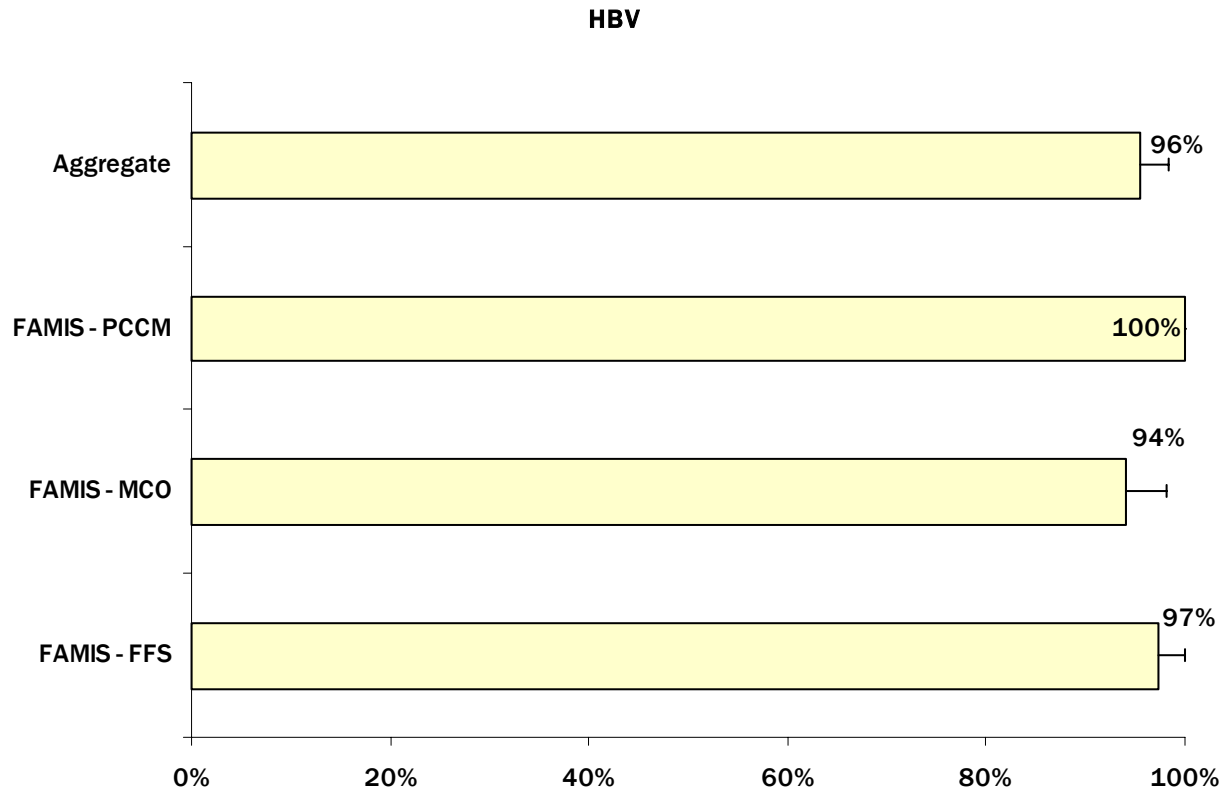
## FAMIS Results by Immunization Series

Figure 9. Percentage of cases with complete DTP immunization, for FAMIS recipients by care delivery system and in aggregate (Virginia Medicaid, CY 2004)



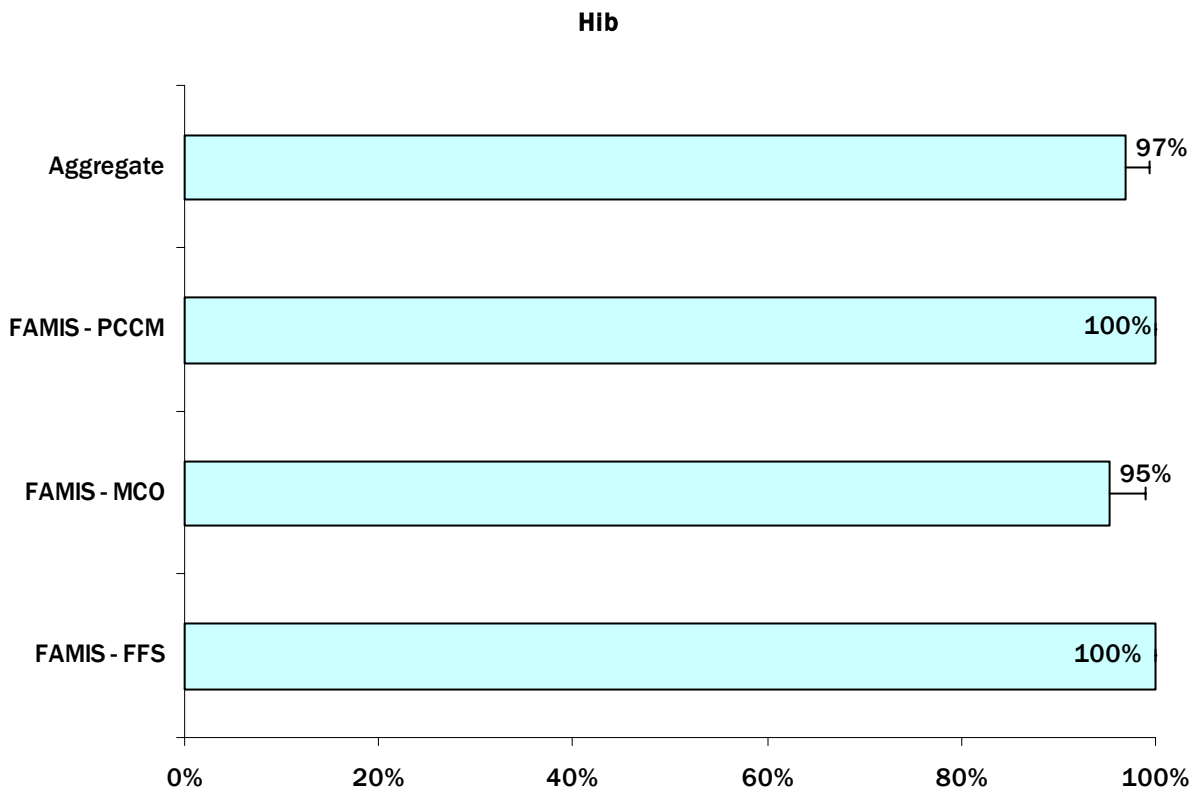
Rates of compliance with the DTP indicator ranged from a high of 95% for FAMIS-FFS, to a low of 88% for FAMIS-MCO. The aggregate FAMIS rate across all delivery systems was 90.3% (CI = 86.2% to 94.4%).

Figure 10. Percentage of cases with complete HBV immunization, for FAMIS recipients by care delivery system and in aggregate (Virginia Medicaid, CY 2004)



Rates of compliance with the HBV indicator ranged from a high of 100% for FAMIS-PCCM, to a low of 94% for FAMIS-MCO. The aggregate FAMIS rate across all delivery systems was 95.5% (CI = 92.7% to 98.4%).

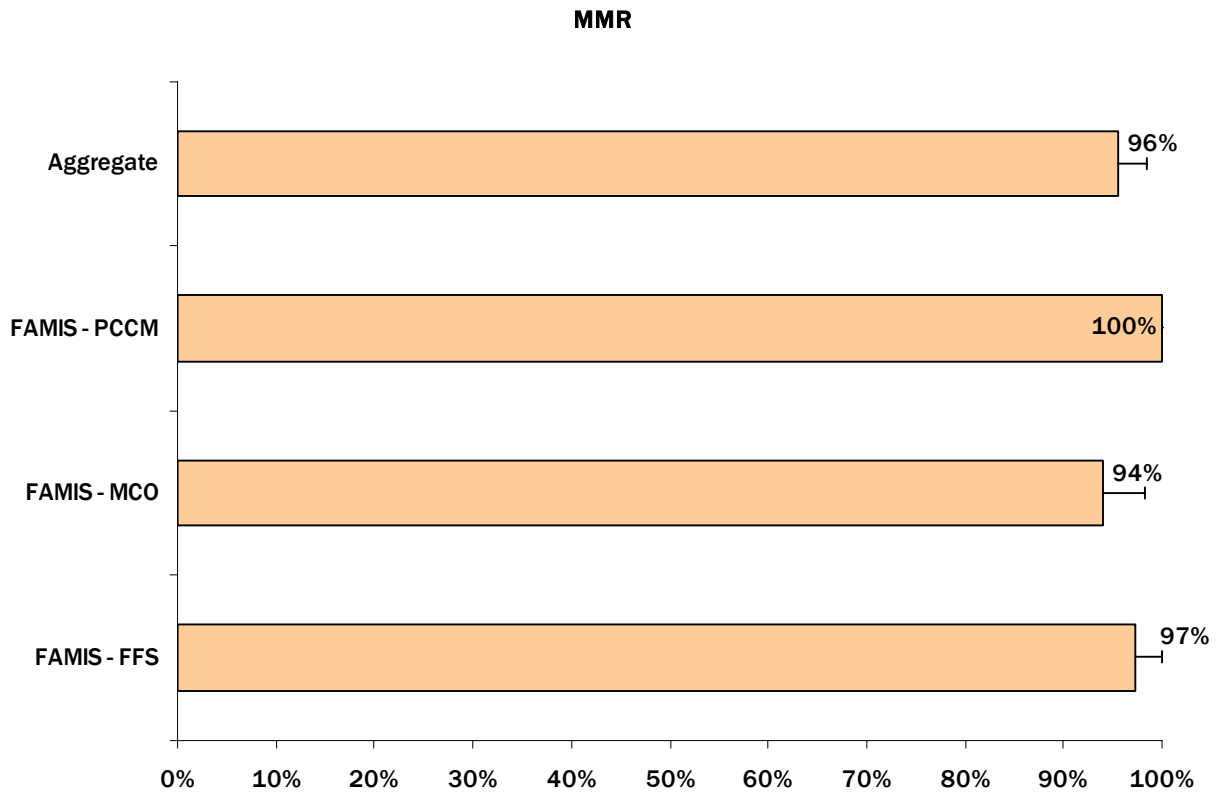
Figure 11. Percentage of cases with complete Hib immunization, for FAMIS recipients by care delivery system and in aggregate (Virginia Medicaid, CY 2004)



Rates of compliance with the Hib indicator ranged from a high of 100% for FAMIS- PCCM and FAMIS- FFS, to a low of 95.2% for FAMIS-MCO. The aggregate FAMIS rate across all delivery systems was 97% (CI = 94.7% to 99.4%).

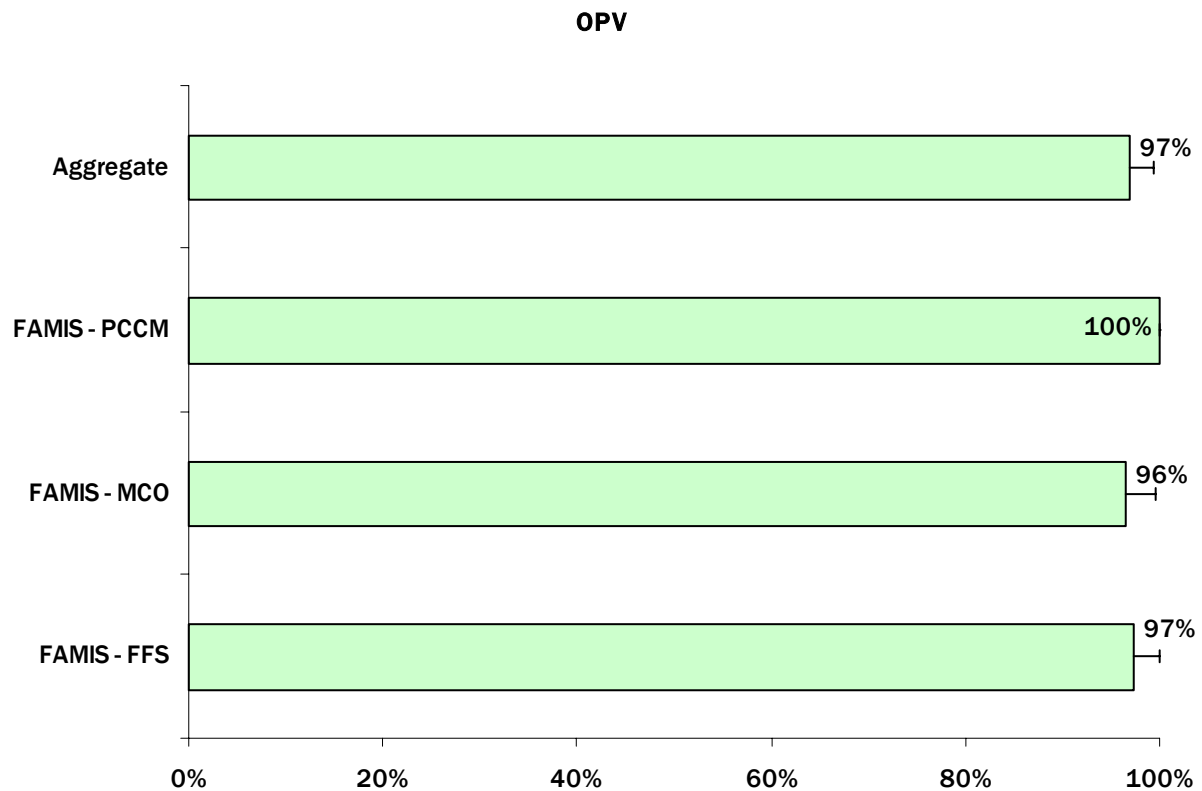


Figure 12. Percentage of cases with complete MMR immunization, for FAMIS recipients by care delivery system and in aggregate (Virginia Medicaid, CY 2004)



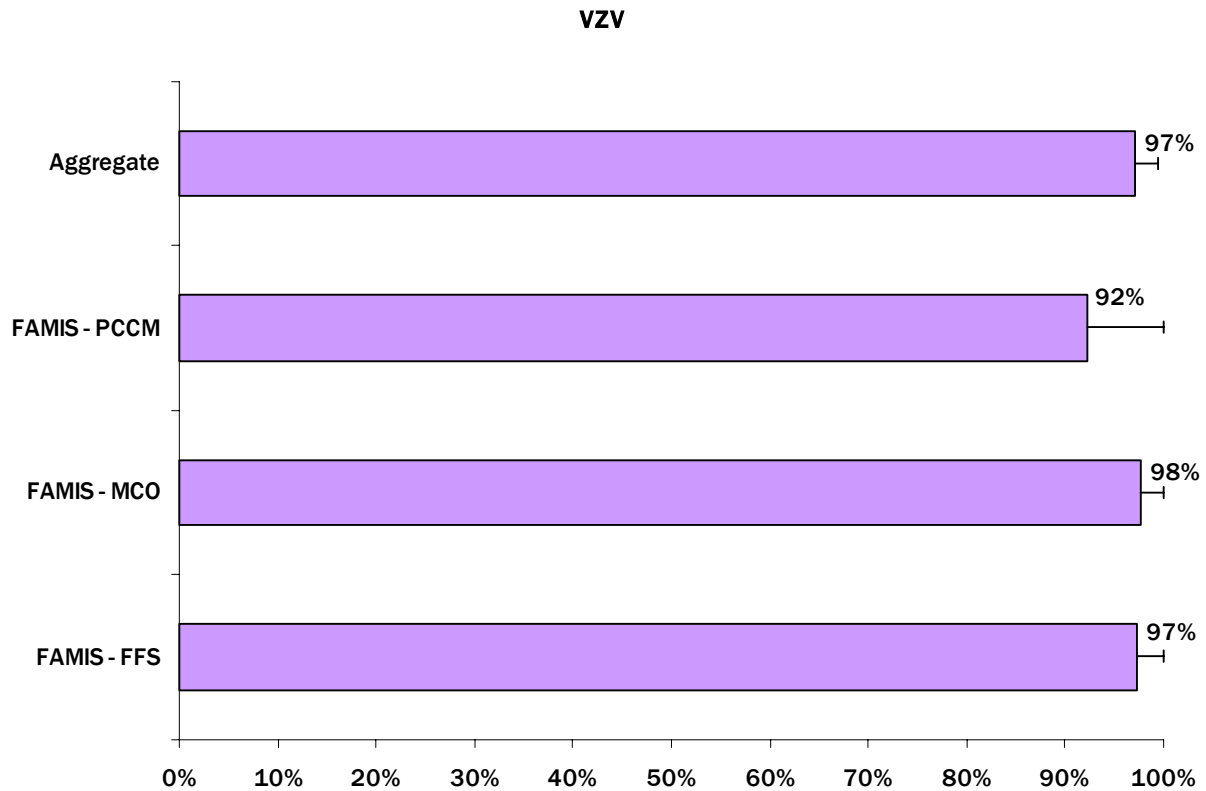
Rates of compliance with the MMR indicator ranged from a high of 100% for FAMIS-PCCM, to a low of 94% for FAMIS-MCO. The aggregate FAMIS rate across all delivery systems was 95.5% (CI = 92.7% to 98.9%).

Figure 13. Percentage of cases with complete OPV immunization, for FAMIS recipients by care delivery system and in aggregate (Virginia Medicaid, CY 2004)



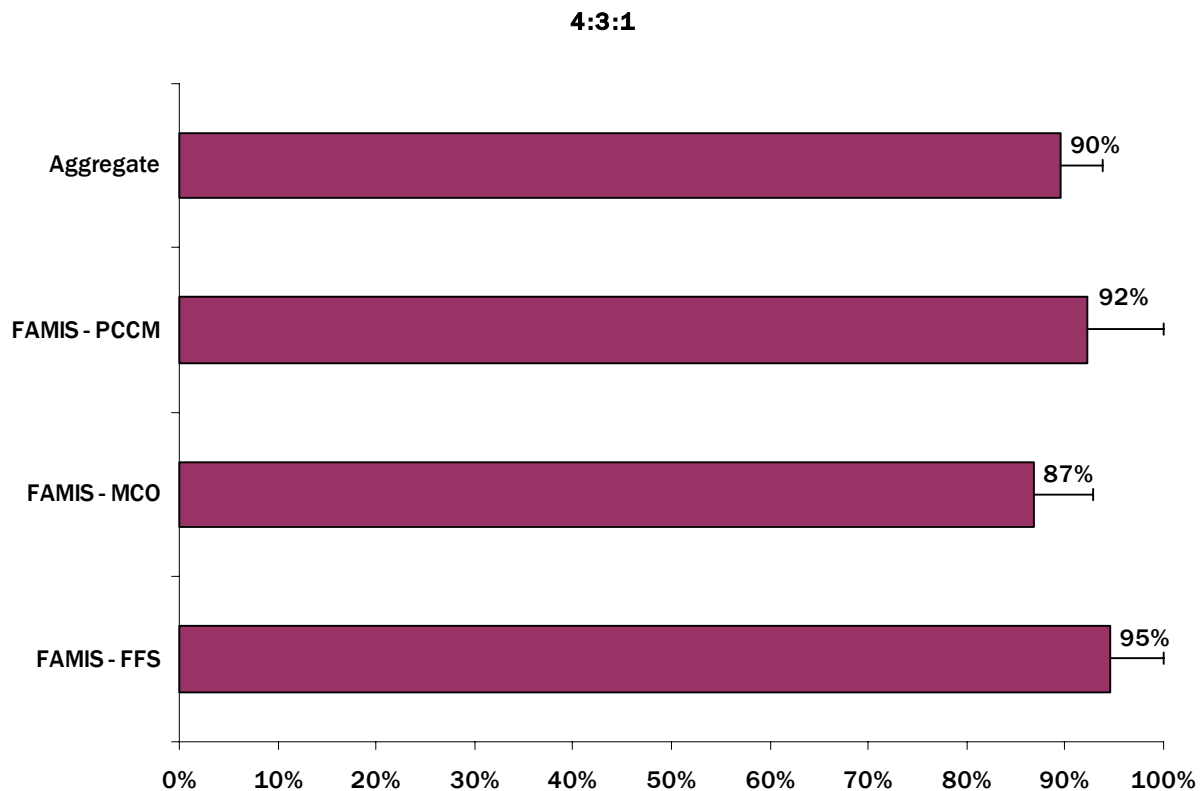
Rates of compliance with the OPV indicator ranged from a high of 100% for FAMIS-PCCM, to a low of 96.4% for FAMIS-MCO. The aggregate FAMIS rate across all delivery systems was 97.0% (CI = 94.7% to 99.4%).

Figure 14. Percentage of cases with complete VZV immunization, for FAMIS recipients by care delivery system and in aggregate (Virginia Medicaid, CY 2004)



Rates of compliance with the VZV indicator ranged from a high of 97.6% for FAMIS- MCO, to a low of 92.3% for FAMIS-PCCM. The aggregate FAMIS rate across all delivery systems was 97% (CI = 94.7% to 99.4%).

Figure 15. Percentage of cases with complete 4:3:1 immunization series, for FAMIS recipients by care delivery system and in aggregate (Virginia Medicaid, CY 2004)



Rates of compliance with the complete 4:3:1 indicator ranged from a high of 94.6% for FAMIS-FFS, to a low of 86.9% for FAMIS-MCO. The aggregate FAMIS rate across all delivery systems was 89.6% (CI = 85.3% to 93.8%).

Overall, the FAMIS providers performed well on all quality indicators (above 85% for all care delivery systems on all indicators). In general, the rates were higher for the FAMIS program providers through the PCCM system and lower for the MCO system. For most of the indicators, the differences in the indicator rates for the care delivery systems are not significant. That is to say, the error bars for the programs and systems in Figures 9 through 15 cover similar ranges; differences in the actual rates by program and system are probably attributable to sampling and not indicative of meaningful differences in programs.

## National and State Comparisons

A comparison of the various immunization indicators reported in this study with other reports of immunization status must be made with caution. As was emphasized at the June 2005 Government Performance and Results Act (GPRA) conference on immunizations, many definitional issues remain to be resolved before reliable formal comparisons between various reported immunization rates can be justified. Similar concerns have been raised in the recent scientific literature (e.g., Darden, 2000; Morrow et al., 2000). Nevertheless, an overall comparison of some typical rates as reported in large-scale studies with known sampling characteristics provides a context for interpreting the rates reported in this study. Figure 16 and Table 7 provide an overview of the immunization rates from this study, the rates from the National Committee for Quality Assurance database of Medicaid managed care programs, and the rates reported for Virginia and the United States in a major national survey of immunization coverage in preschool children. The data for the U.S. Medicaid population are available from the National Committee for Quality Assurance web site<sup>3</sup>, and are based on HEDIS 2005 measures for childhood immunization rates in Medicaid managed care programs. The data for the general Virginia and U.S. populations are from the Centers for Disease Control and Prevention National Immunization Program (NIP) web site<sup>4</sup>. These data are estimated immunization rates for calendar year 2004 from the National Immunization Survey.

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<sup>3</sup> National Committee for Quality Assurance. *Medicaid HEDIS® 2005 audit means, percentiles, and ratios*.

<sup>4</sup> Centers for Disease Control and Prevention National Immunization Program. *Immunization coverage in the U.S.: List of tables, January–December 2003*.

Figure 16. Percentage of cases reported as up-to-date with several immunization indicators. Data for Virginia DMAS programs are based on this report, covering CY 2004. Data for U.S. Medicaid programs are based on the HEDIS 2004 Medicaid Managed Care Report. Data for general U.S. and Virginia populations are based on National Immunization Survey data for calendar year 2004. Note that Hib data for the U.S. General and Virginia General populations is based on three doses.

Figure 16. NIS and HEDIS Comparison Data

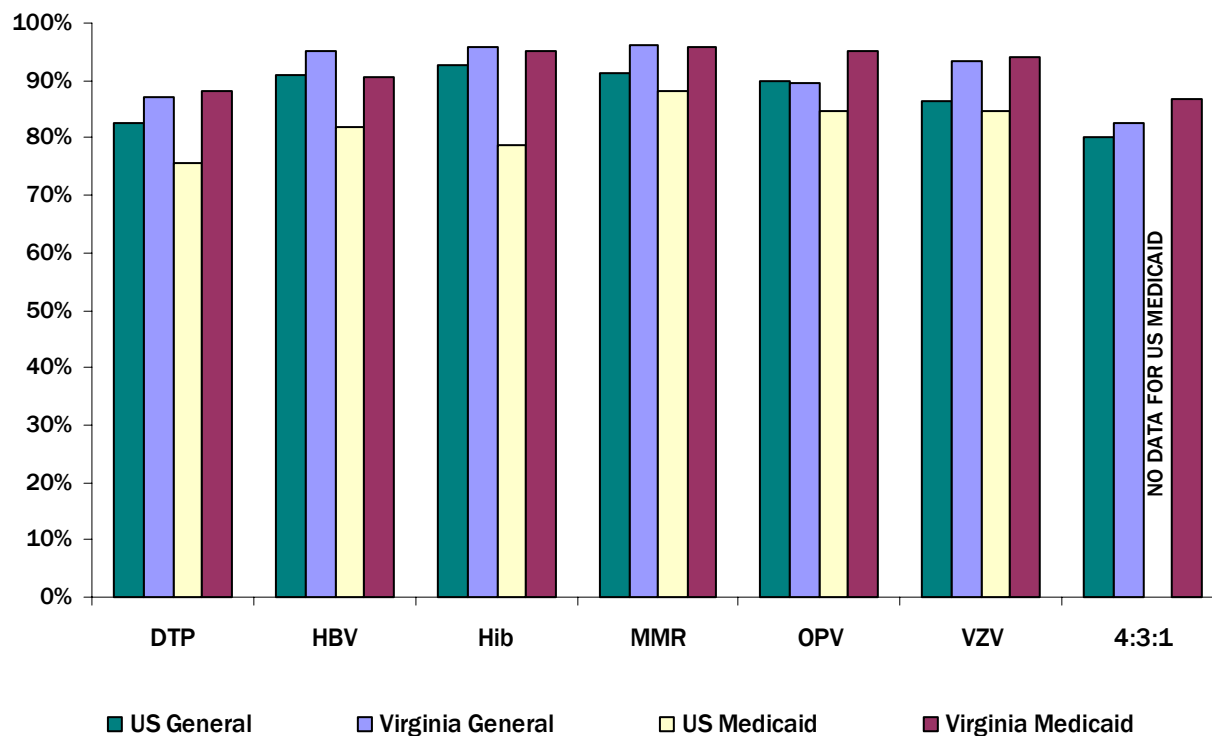


Table 7. Percentage of cases reported as up-to-date for several immunization series (as shown in Figure 15) for benchmark comparisons

Immunization Series	U.S. General	Virginia General	U.S. Medicaid	Virginia Medicaid
DTP	83%	87%	76%	88%
HBV	91%	95%	82%	90%
Hib	93%	96%	79%	95%
MMR	91%	96%	88%	96%
OPV	90%	90%	85%	95%
VZV	87%	94%	85%	94%
4:3:1	80%	83%	NO DATA FOR US MEDICAID	87%

Rates of compliance with these indicators in Virginia Medicaid care delivery systems are consistent with or above the rates obtained in these national and statewide comparison groups. People served by Virginia Medicaid care delivery systems are at or above the immunization levels of the U.S. and Virginia general populations and are well above the levels of the U.S. Medicaid population.

Several key differences between studies exist. Primarily, the populations sampled in the studies differ appreciably, and the population served by Medicaid is not representative of the general population. Additionally, the NIP immunization estimates are based on responses from a telephone interview and are verified by the provider. Statistical techniques were used to account for children whose parents declined participation, children who live in households without telephones, or children whose immunization histories could not be verified through their providers. HEDIS estimates are based on data voluntarily provided by Medicaid managed care plans. The present study was based on a review of the medical records of a random sample of enrollees reviewed by trained personnel. These differing methodologies can introduce different levels and types of bias in the results.

## Trend Analysis

In the previous sections of this report, the results for immunization status at 24 months represented the immunization status for a single point in time. However, to assess quality improvement efforts, trend analysis of changes that occur over time can be more appropriate. A trend analysis effectively shows the change in performance at multiple points in time that might be related to quality of care.

In an ideal design measurement, procedures from time to time would be held constant, so that observed differences in performance could more clearly reflect patterns of care, as opposed to a change in methodology. Such ideal designs are rarely implemented, however, and it is often necessary to make comparisons between measures that have been obtained using different procedures or methods. In the present study, the immunization quality indicators observed for CY 2004 were compared with compliance rates for those indicators for SFY 1998, 1999, 2000, 2002, and 2003 as reported to DMAS. However, the methods for assessing up-to-date immunization rates for the indicators varied among the studies.

A major methodological difference between the studies conducted in 1998 and 1999, and the 2000, 2002, 2003, and 2004 studies is in data collection techniques. The 2000, 2002, 2003, and 2004 studies were based on a focused review of medical records from a randomly selected sample of Medicaid-eligible individuals. The previous studies used several different data sources, including encounter data and physician surveys. This comprehensive approach was more likely to detect immunizations that may have been delivered by providers other than the primary care provider. The medical record review methodology used in the current study (and for 2000, 2002, and 2003) only captured immunizations referred to in the medical record. Additionally, the



1998 and 1999 comprehensive approach may have resulted in the inclusion of cases in which providers were better equipped or more fully staffed than the “typical” provider, which could be associated with an increase in the percentage of cases reviewed with more complete documentation of immunization status. Therefore, previous studies may have overestimated general compliance rates. Additional supplemental encounter and administrative data and information from a supplemental provider survey were used to complete the data collection process. In the present study, a more effective sampling procedure was employed to permit a more stable baseline measurement that would be sensitive to improvements in the quality of care by “typical” providers.

Given that some of the variability in reported rates over time may be due to methodological differences among the studies and not actual differences in the quality of care delivered to Medicaid and FAMIS enrollees over time, caution is recommended in interpreting the results. Figure 17 compares compliance rates for key indicators observed in the current study with those reported for SFY 1998, 1999, 2000, 2002, 2003, and 2004.

**Figure 17. Percentage of cases reported as up-to-date with several immunization indicators. Data for Virginia DMAS programs are based on this report and previous reports by Delmarva, covering SFY 2000, 2002, and 2003. Data for 1998 and 1999 are based on data provided by DMAS.**

**Figure 17. Up-to-Date Cases**

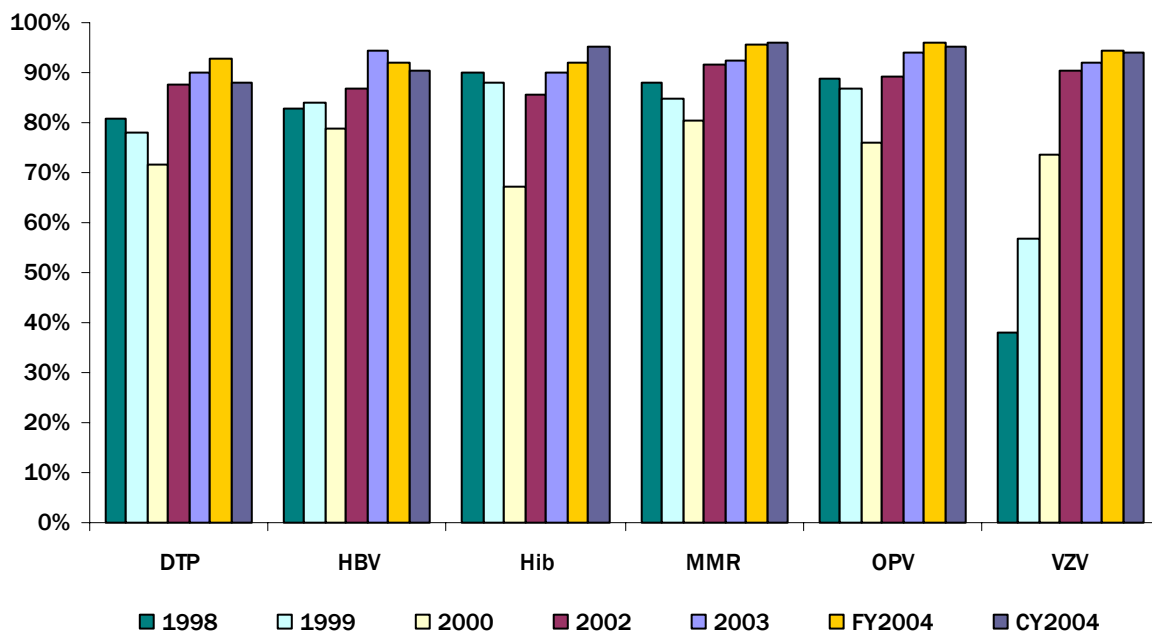


Table 8. Percentage of cases reported as up-to-date for several immunization series (as shown in Figure 17) for SFY 1998, 1999, 2000, 2002, 2003, and 2004

Immunization Series	1998	1999	2000	2002	2003	FY 2004	CY 2004	% Change 1998–CY2004
DTP	81%	78%	72%	88%	90%	93%	88%	7%
HBV	83%	84%	79%	87%	95%	92%	90%	7%
Hib	90%	88%	67%	85%	90%	96%	95%	5%
MMR	88%	85%	81%	91%	93%	95%	96%	8%
OPV	89%	87%	76%	89%	94%	96%	95%	6%
VZV	38%	57%	73%	91%	92%	94%	94%	56%

As a whole, the current rates of immunization are relatively high and demonstrate marked improvement over previous years; the changes demonstrated for Medicaid and FAMIS programs statewide shown in Figure 17 (and Table 8) are sizeable especially when compared with SFY 2002. . In general, compliance rates for up-to-date immunizations for children at 24 months appear to have dipped moderately in 2000 and have increased and exceeded baseline (1998) levels in 2003. The dip in rates before and during 2002 may be attributable to shortages in some vaccinations that began in 2000 and ended in 2002. Efforts by DMAS to improve rates have resulted in a substantial increase from baseline levels.

Although the dosage requirements for this indicator were different for the SFY 2000, 2002, and 2003 studies as compared to the earlier studies, the dosage requirements do not appear to track with the immunization series compliance rates. There does not appear to be any relationship between compliance rates and dosage requirements. In the 1998 and 1999 childhood immunization studies for Medicaid enrollees in Virginia, the administration of 3 doses of Hib vaccine by age 24 months met the standard of care; in the SFY 2000, 2002, and 2003 studies the administration of 4 doses by age 24 months was the defined standard of care. However, in the current study, CY 2004, the standard of care has returned to three doses by age 24 months.

## Conclusions and Recommendations

**The results demonstrate that Medicaid and FAMIS service providers have maintained an acceptable quality level in the area of childhood immunizations.** Rates of compliance for specific antigens and a key series of immunizations (4:3:1) meet or exceed standards reported by Medicaid and FAMIS managed care programs through HEDIS®. A steady increase in the rate of VZV between 1998 and 2004 suggests that

Virginia Medicaid and FAMIS providers have taken a proactive approach to increasing the rates of VZV immunization.

**Continued efforts within a continuous quality improvement framework are needed to meet the growing demands placed on providers with respect to early childhood immunization.** The growing numbers of vaccines and the complexity of vaccination schedules will make delivery of appropriate vaccinations in a timely manner increasingly more difficult. Educational efforts for both providers and parents of vulnerable children will be required to meet this challenge (see, e.g., Fitzgerald, 2000).

**The Government Performance and Results Act (GPRA) project has focused attention on state efforts to improve immunization compliance.** Virginia has set an ambitious immunization compliance target of 85%. Other states have set targets that range from 60% to 90% with baseline measures of 19% to 82%.<sup>5</sup> Virginia has met its compliance target for all of the single customary immunizations. The combined series (4:3:1) have target at 87% for Medicaid programs and 90% for FAMIS programs.

**A few suggestions for Medicaid and FAMIS programs to improve their immunization rates are as follows:**

The national goal is a 90% immunization rate for 2 year old children. When immunization rates begin to approach this national goal, the annual increase is much smaller even with the same or additional efforts. Unfortunately, the level of effort may decrease after a few years of reaching a high state goal even though the national one has not been attained. When this occurs immunization rates not only decrease, but occasional outbreaks of vaccine preventable diseases occur. Therefore, when rates are at the level found in this study the objectives might be:

- Maintain the emphasis and efforts on improving the 2 year old immunization rate to the national goal of 90% or higher. This has been achieved in the Medicaid population by states.
- Procedures to translate improvements in data to improvements in care should be implemented. For example, more accurate tracking of immunizations could permit targeted outreach efforts. Use of patient immunization tracking software may enable provider offices to further increase the rate of complete immunizations. Parents could be taught to access systems that could provide feedback regarding the immunization status of their children (e.g., Adams et al., 2000; Fitzgerald et al., 1998).
- Determine if children are getting vaccine at sites other than their PCP and these are not recorded in the medical record with the PCP. Immunization rates have been found to be higher when 2 year old immunization surveys include these components:

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<sup>5</sup>Murphy, L. (Centers for Medicare and Medicaid Services). (2002, March). Presentation given at the Government Performance and Results Act Immunization Conference, Albuquerque, NM.

- Parents contacted by telephone for the immunization record along with the sites for vaccine delivery, and
- Immunization staff contacts all vaccine sites to validate vaccine delivery.

This type of survey requires more resources but could be done periodically to determine if rates are actually higher with this method. Immunization registries are often helpful in these cases because health departments routinely enter immunizations given at their sites.

- Establishment of immunization registries and coordination of the delivery of needed immunization information to providers at the point of service are ways to provide feedback to providers regarding the immunization status of their patients (e.g., Miller et al., 1997; Wood et al., 1999).
- Conduct a study of a sample of children delinquent in their immunizations to better understand barriers to a higher rate and the strategies most likely to achieve the goal desired.
- Initiation of parental educational efforts, during the prenatal period, regarding the importance of childhood immunizations will provide early reinforcement of the need for childhood immunizations.
- Evaluation of the cost-effectiveness of changing primary care provider or clinic hours to enhance access to care may enhance parental compliance in obtaining the necessary immunizations.
- Development of outcome measures that capture the realized opportunity for immunizations at each visit may provide a more sensitive measure for assessing quality improvement efforts.

DMAS has used the Government Performance and Results Act (GPRA) guidelines for previous study methodologies. Since GPRA guidelines are based upon fiscal year (FY) data, DMAS has been unable to compare trends in MCO data, which is based upon calendar year. Delmarva recommends utilizing HEDIS methodology for future immunization studies. By using HEDIS methodology, DMAS will be able to compare trends in MCO data.

In conclusion, the Virginia DMAS care delivery systems and aid programs are performing better than the national rates for Medicaid and FAMIS programs in all vaccines. Vaccination rates have continued to increase. Especially conspicuous is the dramatic increase in the rate of VZV vaccination from 1998 through 2004. The high rates of immunization achieved by DMAS and its partners are commendable. Continued efforts by DMAS with the support of its partners and the Commonwealth of Virginia will most certainly ensure that high-quality preventive care is provided to Virginia's most vulnerable population.

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